

Upland Forest Planting Trial Lower Cedar River Municipal Watershed Project Description and As-Built 2005

Overview

The Cedar River Municipal Watershed (CRMW) Habitat Conservation Plan (HCP) aims to restore and enhance biodiversity in the watershed. The primary tools for this work in upland forests are thinning and planting. While thinning is an appropriate tool to facilitate understory development in much of the light-limited forest of the watershed, there are also many areas where the overstory canopy is not completely closed and understory diversity appears to be limited by shrub competition or poor site quality. This planting trial will attempt to identify limiting factors to the establishment and growth of diverse tree species, including: (1) overstory competition for light, (2) understory competition for light, (3) understory competition for belowground resources, and (4) site quality.

This project focused on forests of the lower CRMW where overstory diversity is low and dominated by Douglas-fir (*Pseudotsuga menziesii*) but the canopy is open enough to allow a dense shrub layer. In sites with the poorest soil conditions the shrub layer is dominated by salal (*Gaultheria shallon*) and vine maple (*Acer circinatum*). We expect that if we create canopy gaps in the forest, these two species will respond by further filling in any gaps. However, we are interested in increasing understory and ultimately overstory plant diversity, not simply increasing the amount of salal and vine maple. We hypothesize that planted conifer and deciduous trees will grow on these sites, ultimately reaching the overstory, if shrub competition is controlled with site preparation. By manipulating overstory cover and understory competition, we will explore the influence of overstory and understory competition on diverse tree species growth on these sites and increase our ability to alter diversity through planting.

Planting Trial Design

Locations were selected in the lower watershed that have a Douglas-fir overstory and a predominantly salal and vine maple understory. Overstory canopy cover was relatively open, but the gap sites were not located in already existing gaps that were filling in with vine maple or other shrub species.

Nine gaps of 14 meters on a side were created by falling overstory trees to the outside of the gap. The portion of the trees fallen in the gap were bucked and moved outside the gap. Planting spots were laid out on three parallel transects north to south through each gap (figure 1). Transects extended ten meters beyond the created gap, on the south side of each gap. At least five planting spots per transect were outside the gap to test the importance of gap creation. Edges of the planting spots were one meter from the next spot.

Three different techniques were used for site preparation. In three of the gaps, trees were planted with no site preparation. In three of the gaps the shrubs were clipped at ground level in a one-

meter diameter planting spot for each tree. In the final three gaps, planting spots were cleared in a one meter diameter circle and roots grubbed out. Site preparation was randomly selected for each gap.

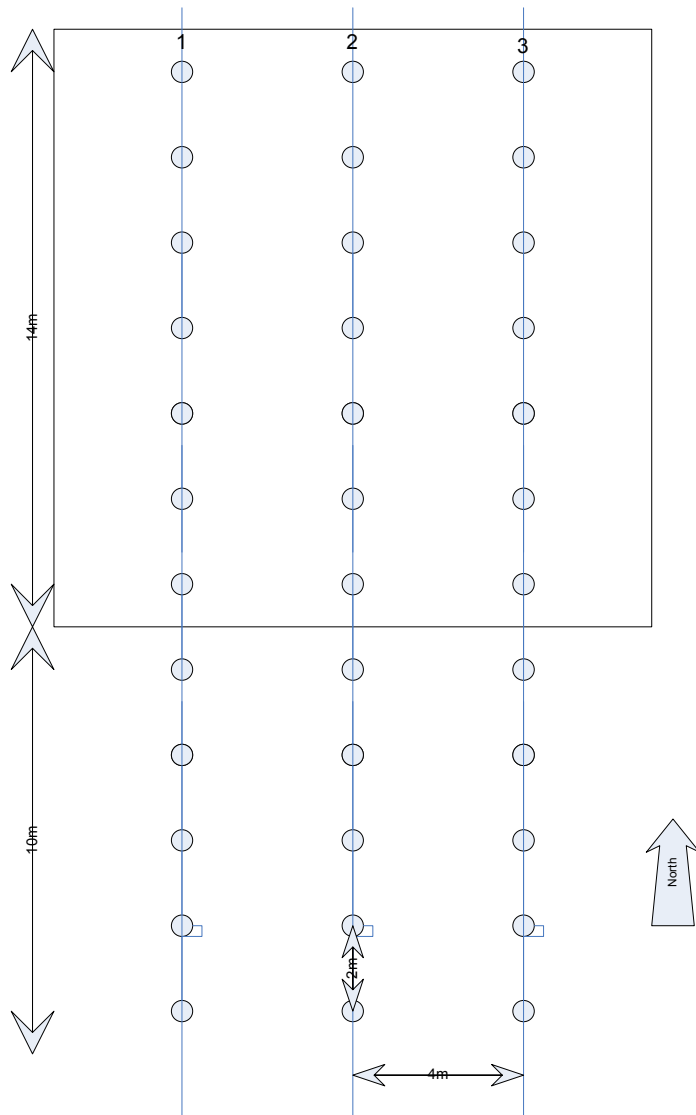


Figure 1: Diagram of planting layout showing gap, transects extending through and to the south of the gaps, and planting

Three species of trees were planted along the transects: western red cedar (*Thuja plicata*), western hemlock (*Tsuga heterophylla*), and big leaf maple (*Acer macrophyllum*). Each transect was planted with a single species, and each gap had all three species. Each transect was marked at the north end with rebar and PVC. The PVC was marked with the gap and transect number. Each tree seedling was tagged with an aluminum tag on a low branch. Trees were numbered with the following system: Gap Number – Transect Number – Seedling Number (North to South) (Table 1).

Table 1: Gap and Transect numbers with site preparation treatment and species.

Gap Number	Transect Number	Site Prep Treatment	Species
1	1	Grub	Hemlock
1	2	Grub	Cedar
1	3	Grub	Maple
2	1	Clip	Hemlock
2	2	Clip	Cedar
2	3	Clip	Maple
3	1	Clip	Cedar
3	2	Clip	Maple
3	3	Clip	Hemlock
4	1	Clip	Maple
4	2	Clip	Hemlock
4	3	Clip	Cedar
5	1	Grub	Cedar
5	2	Grub	Maple
5	3	Grub	Hemlock
6	1	No treat	Hemlock
6	2	No treat	Cedar
6	3	No treat	Maple
7	1	No treat	Cedar
7	2	No treat	Maple
7	3	No treat	Hemlock
8	1	Grub	Maple
8	2	Grub	Hemlock
8	3	Grub	Cedar
9	1	No treat	Maple
9	2	No treat	Hemlock
9	3	No treat	Cedar

Implementation

In November, 2005 nine gaps were installed off the 50.3 Road and the 55 Road in the lower CRMW. Trees were felled by SPU operations staff. A contractor with Kemp West moved the logs to the edges of the gaps using a Spyder with a grapple head. An Earth Corps crew did site preparation work, laid out transects, planted, measured and tagged trees November 15-16 and 21-23, 2005. The following map shows the GPS'd location of the nine gaps (figure 2). The only change to transect and planting design was an additional tree was added to the end of each transect. Each transect consists of at least 13 trees, with seven in the gap and six outside the gap.

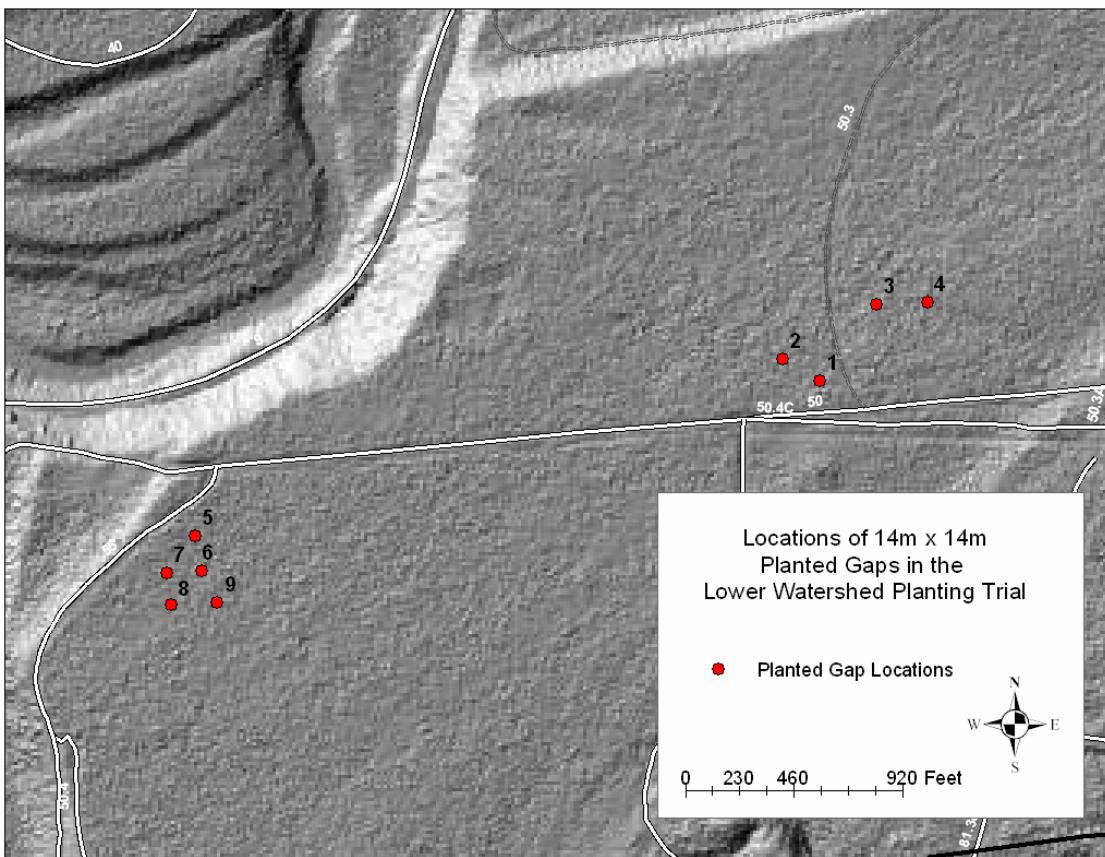


Figure 2: Locations of nine planted gaps off the 50 Road in the lower watershed.

Lessons Learned

In general the project went smoothly and quickly. Gaps were intended to be laid out far enough apart so that they did not influence each other, but in some cases they were closer than would be desired.

The site preparation treatments did not end up as distinct as originally planned. The treatment of planting directly into the shrubs ended up similar to the grubbing, because so many rocks had to be removed during the planting process. Grubbing could have been done in a larger circle around each tree. We should consider ways to maintain or augment the site preparation treatments to make them distinct.

Monitoring

Height and caliper at ground level were collected on each tree at the time of planting. Height was defined as the highest point without providing additional support or straightening to the tree (especially important for western hemlock). Currently data are stored in an excel spreadsheet in the Science Information Catalog, an internal SPU document storage devise.

Trees should be checked for survival yearly for the next five years. Growth will be measured in 2006, 2008 and 2010 at a minimum. After five years the monitoring plan will be revisited.

In 2006 attention should be paid to the effects site preparation treatments to determine if they need to be maintained or augmented.